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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/653,507	09/02/2003	Gerald N. Coleman	02-470	3889

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PATENT DEPT.  
PEORIA, IL 616296490

EXAMINER

SOLIS, ERICK R

ART UNIT PAPER NUMBER

3747

DATE MAILED: 01/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/653,507

**Applicant(s)**

COLEMAN ET AL.

**Examiner**

Erick R Solis

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-16, 18, 19, 21, 23-37, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loye ('157) in view of Hapeman. zur Loye teaches operating an engine which may operate in a PCCI mode wherein fuel is evenly distributed throughout the combustion chamber. An oxidant (air) is introduced into the combustion chamber as well as a diluent (EGR). Inherently the diluent (EGR) will have the effect of slowing down the combustion which will result in a longer combustion duration and lower combustion pressures. zur Loye, however, does not teach using an injector with a plurality of holes for injecting fuel streams at different spray angles. Hapeman teaches a two stage injector which can vary the angle of fuel spray

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depending on engine load. It would have been obvious to have used a fuel injector in zur Loye's engine, as taught by Hapeman because this would have provided for better combustion by allowing for better directional control of the fuel spray dependent on engine parameters.

4. Claims 1-16,18,19,21, 23-37, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loye in view of Shafer et al. zur Loye applies as above, but does not teach using an injector with a plurality of holes for injecting fuel streams at different spray angles. Shafer et al teach a an HCCI engine with an injector which can vary the angle of fuel spray depending on type of combustion mode. It would have been obvious to have used a fuel injector in zur Loye's engine, as taught by Hapeman because this would have provided for better combustion by allowing for better directional control of the fuel spray dependent on engine combustion mode.

5. Claims 17,22 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loye in view of either one of Hapeman or Shafer et al, as applied above, and further in view of Chanda et al. The combinations above do not teach the technique of separating oxygen and nitrogen from air to aid in reducing pollutants. Chanda et al teach the use of supplying either and/or both of nitrogen into the combustion chamber to reduce such pollutants (see col. 7, lines 5-21). It would have been obvious to one of ordinary skill in the art to have supplied oxygen and /or nitrogen into the combustion chamber of zur Loye, as taught by Chanda et al, since this would have aided in further reducing pollutants from the engine.

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6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over zur Loye in view of either one of Hapeman or Shafer et al, as applied above, and further in view of Walter et al. The combinations above do not teach the percentage of diluent being in the claimed range. Walter et al teaches such in claim 13. It would have been obvious for zur Loye's diluent to have been in the claimed range since such range is already known and taught by Walter et al.

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1-40 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erick R Solis whose telephone number is (571) 272-4853. The examiner can normally be reached on Monday-Thursday.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-3700.

A handwritten signature in black ink, appearing to read "Erick R Solis".

Erick R Solis  
Primary Examiner  
Art Unit 3747

ers  
January 24, 2005